DEPARTMENT OF CONSERVATION

OFFICE OF MINE RECLAMATION

801 K STREET • MS 09-06 • SACRAMENTO, CALIFORNIA 95814

PHONE 916 / 323-9198 • FAX 916 / 445-6066 • TDD 916 / 324-2555 • WEB SITE conservation.ca.gov

California Abandoned Mine Lands Forum Meeting

Held at the Sacramento Office of Shaw Environmental
December 14, 2005, 9:00 a.m. to noon

MEETING MINUTES

Facilitator: Mary Kay Lahay, Lahay & Associates

Meeting Summary: Mary Kay Lahay, Lahay & Associates
Sarah Reeves, Department of Conservation

Attendees

Cy Oggins, CA Department of Conservation, Abandoned Mine Lands Unit (DOC/AMLU)	Susan Kohler, CA Geological Survey
	David Lawler, BLM/CASO
Sarah Reeves, DOC/AMLU	G. Fred Lee, G. Fred Lee & Associates
Dave Biebes, Geocon	Curtis Lindskog, Shaw Environmental
Tim Calloway, Cherokee Development	Rick Lyon, Lake County Env. Health
Mike Dunn, U.S. Forest Service	Greg Pelka, CSLC
Tom Filler, CA State Lands Commission (CSLC)	Greg Reller, Tetra Tech
Tracy Gidel, Nevada County	Craig Rohrsen, Creekside Video
Richard Grabowski, Bureau of Land Management, CA State Office (BLM/CASO)	Andrew Rush, DOC, Division of Land Resource Protection
Roger Hothem, U.S. Geological Survey	Rick Weaver, U.S. Forest Service
Steve Jenkins, CSLC	Becky Wood, Teichert
John Key, BLM/CASO	

Agenda

1. Welcome and Introductions and Agenda Review
2. Presentation: Boston Hydraulic Mine: Pilot Mercury Cleanup Project, Red Dog Mining District, Nevada Co. California by David Lawler, Greg Reller and Tim Callaway
3. Presentation: Sailor Flat Hydraulic Mine: abandoned mine cleanup on the Tahoe National Forest conducted under authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) by Rick Weaver.
4. Open Discussion on Forum Coordination, including Proposed Changes to AML Forum Charter related to the Selection of Forum Guiding Committee (see attached)
5. Set date and time for next meeting

Meeting Minutes

1. Welcome, Introductions and Agenda Review

Forum Facilitator Mary Kay Lahay called the meeting to order and welcomed attendees. Quick individual introductions were done and we thanked Shaw Environmental for hosting this quarter's meeting. No changes to the agenda were proposed.

2. Presentation One: Mercury Cleanup at the Boston Placer Mine, Nevada County, California

Presenters: David Lawler - BLM CASO - AML Program
Greg Reller - Tetratech/EMI - Senior Staff Scientist
Tim Callaway - Cherokee Development

General Overview: Inactive placer gold mines are present throughout the foothills of the Sierra Nevada Mountains of California. It is estimated that about 30 million pounds of liquid elemental mercury was used to recover fine gold during active mining and 10 to 30 percent of the mercury used may have been lost to the environment. Modern miners report encountering liquid mercury in streams and at mines. Sampling took place throughout the region by an interagency Bear-Yuba watershed mercury assessment team. Mercury is accumulating in fish used as a human food source. Mercury is also accumulating in insects and other organisms.

Inactive placer gold mines typically consist of:

- A pit surrounded by high walls (from a few feet to more than 100 feet high).
- A pit floor containing ground sluices (less than an acre up to a couple of square miles).
- Pit lakes and wetlands (from a few square feet to acres). These pit lakes and wetlands have the potential to be mercury methylation sites.
- Pit drains known as sluice tunnels (from 10's to 1,000's of feet long).

Sluice tunnels were developed to recover placer gold by gravity as well as discharging the sediment into the nearby watersheds. Liquid mercury was poured into the sluices periodically (10 pounds per linear foot per season). Liquid elemental mercury migrated downhill through the sluice cuts and tunnels (mercury is very heavy and collects in low spots in sluice tunnel floors, sluice cuts and stream channels). Fine gold was amalgamated by the mercury resulting in its entrapment and recovery by the miners. The liquid mercury regularly escaped to the environment at the sluices.

Boston Mine Overview: The Boston Mine is located in the Red Dog Mining District in the Greenhorn Creek Drainage. It operated during the 1860s through the 1930s and gold production assessment was completed in the 1980s. A number of studies were subsequently conducted pursuant to a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Removal Action process:

- The USGS conducted biannual sediment, water, and biota sampling from 1999 though 2003.
- The BLM conducted a bulk sediment analysis in 2003.

- Tetra Tech conducted the removal site investigation in 2003.
- The BLM and Tetra Tech conducted a treatability study in 2004.
- Tetra Tech prepared an engineering evaluation and cost analysis.

Between the USGS study and the Removal Site Investigation, the following results were reported.

- Bioaccumulation of mercury in insects and frogs at the Boston mine sluice tunnel outlet ranked second highest in the Bear-Yuba watersheds.
- Liquid elemental mercury was identified in sluice tunnel sediment and plunge pool sediment.
- Mercury in frogs at wetland onsite was not remarkably high in comparison to frogs at other sites in the region.
- Humans and biota could be exposed to mercury at concentrations much higher than benchmarks.
- Biota at Boston Mine accumulate more mercury than similar biota at most other inactive placer mines in the region.
- High likelihood exists that mercury could migrate to the watershed.

Seven removal action alternatives were evaluated based on effectiveness, implementability, and cost.

- No Action
- Surface and Institutional Controls
- Seal in place, Surface and Institutional Controls
- Excavate Sediment, Solidify, Bury on Site, Surface and Institutional Controls
- Excavate Sediment, Physical Separation, On or Off Site Disposal, Sealing, and Surface and Institutional Controls
- Excavation, Off Site Retorting, Sealing, and Surface and Institutional Controls
- Excavation, On Site Repository, Sealing, and Surface and Institutional Controls

The final alternative selected was excavation of sediment, physical separation, onsite disposal (due to remote location), sealing, and surface and institutional controls.

Removal Action: Tim Calloway of Cherokee Development who did the work as a subcontractor to Tetra Tech, presented the details of the clean-up operation. The goals were to clean out sediment, physically separate the mercury, keep people out of the site during the operation, and complete the project on time and within budget. Tim presented numerous slides that illustrated each phase of the clean up work including sometimes-unique tools used.

- A slusher was used to excavate sluice tunnel sediments. 93 cubic yards of sediment were removed from sluice tunnel.
- Excavated 26 feet down into a feeder shaft. Plugged shaft with concrete cone.
- Sediments (from shaft and tunnel) were run through a physical separation process that included the use of a trammel, a centrifugal bowl and a spiral pan.
- Concentrates were encapsulated in 3 levels of concrete and deposited into the excavated shaft along with the cleaned sediments.
- A concrete lining 6 inches to 2 feet thick was installed in the tunnel to further sequester possible mercury.

- An OHV crossing (concrete apron) was installed across stream channel/ground sluice) and the stream channel was lined with boulders for erosion control.
- A bat compatible closure was installed in the tunnel.

Discussion: At the conclusion of this presentation, cost issues were discussed, which led a discussion on the challenges and potential desirability of discussing at a future Forum meeting the topic of cost-benefit analyses of different remediation alternatives selected by agencies conducting remediation projects.

For more information about the removal action, contact Tim Calloway at (530) 269-0886.

3. Presentation Two: Sailor Flat Hydraulic Mine Cleanup

Presenter: Rick Weaver, U.S. Forest Service (USFS), Tahoe National Forest

General Overview: The USFS conducted an Abandoned and Inactive Mine Survey (AIMS) from 1993-1998. This inventory effort was to identify sites of hazardous substances releases (such as mill sites and mine waste discharge), erosion and sedimentation, and hazardous mine openings. The Tahoe National Forest recorded 353 AML sites including 195 placer gold mines (22 of which are hydraulic mines) and 158 hard rock lode gold mines (57 of which had mill sites). Other minerals mined besides gold included chrome, copper, molybdenum, silver and asbestos.

Mercury was used in various mining and gold recovery methods including placer deposits, hydraulic, dredging, and hard rock deposits (stamp mills). Hydraulic mining took place between 1850 and the 1900s. Hundreds to thousands of pounds of mercury were applied to each sluice per year and about 10-30 percent was lost to the environment. Hundreds of processing sites were in the Sierra Nevada and Klamath Mountains. Dredging occurred between the 1900s to the 1950s, and mercury was used extensively to recover fine gold. Hydraulic mine sites within or adjacent to the boundary of the Tahoe National Forest in the Bear and South Yuba Watersheds include:

- Sailor Flat
- Buckeye
- Boston
- Alpha
- Relief Hill
- Remington Hill
- Lowell Hill
- Malakoff Diggins
- Scotchman Debris Dam (an unstable structure with lots of sediment behind and an unknown quantity of mercury)

Typically, hydraulic mine sites are associated with drain tunnels, sluice cuts, wetlands and lakes (potential mercury methylation sites), drainages, and debris dams.

The USFS has the authority to act as lead agency and perform investigations and removal action under the CERCLA. The U.S. Department of Agriculture (USDA) definition of a CERCLA site is where there is a release or potential release of a hazardous substance, pollutant, or contaminant into the environment that may affect human health or the environment. A site must qualify for a CERCLA action before the

USFS can use its CERCLA enforcement authority. The USDA policy requires that a site meeting these qualifications be cleaned up using CERCLA authority. The typical CERCLA response is the removal action process. During this process:

- A site management team will address the environmental issues.
- A site characterization is documented in a Preliminary Assessment Site Inspection.
- An engineering evaluation and a cost analysis of different removal action alternatives are prepared.
- A responsible party search is conducted.
- An opportunity for public comment on the alternative is given.
- A recommendation for mitigation and monitoring is made.

Sailor Flat: The Sailor Flat Hydraulic Mine is located about 2 miles east of Scotts Flat Reservoir and 8 miles east of Nevada City at the headwaters of the Greenhorn Creek Drainage. The area was mined before the turn of the last century. Sailor Flat is a small site (2-3 acres) with both a drain tunnel inlet and outlet and a pit highwall. The area was mined before the turn of the last century and mercury was used to trap gold. Today, decaying wood in the sluices, stagnant water, and the sulfide compounds present make a perfect environment for bacteria to methylate the mercury in the sediment. Both elemental mercury and methylmercury enters the aquatic and forest ecosystems from this site; disturbed sediment near the mining area had mercury levels 4 times higher than the U.S. Environmental Protection Agency (USEPA) standard.

In 2003, a Non-Time Critical Removal Action was conducted in the Greenhorn Creek watershed to prevent discharges of mercury and methylmercury to surface water from the Sailor Flat Hydraulic Mine site. Three alternatives were described in review documents:

- No action
- Excavate the 120-foot tunnel and stabilize the contaminated sediment with cement or other material. Also, regrade the surface and seal the adits on site.
- Fill tunnel with cement or other material to stabilize the contaminated sediment. Also, plug the drain tunnel and regrade the surface and seal the adits.

The USFS action was to:

- Excavate the soil and the rock above the tunnel for 120 feet,
- Use concrete and a synthetic mixture to stabilize the contaminated soils,
- Backfill and grade the channel to carry the water
- Riprap the channel to prevent erosion
- Stabilize pit walls and seal two adits

Discussion: After the presentation, additional discussions occurred related to costs and benefits of various abandoned mine remediation projects. For example, requests were made to compare the costs/benefits of the projects at the Boston Mine and Sailor Flat.

For more information about the USFS removal action at Sailor Flat, contact Rick Weaver at rweaver@fs.fed.us.

4. Forum Charter Changes

Cy Oggins began this agenda item by stating that changes to the meeting's original proposed agenda topic—a discussion of "Good Samaritan" laws and related legislation being proposed on the federal level—were necessary because of restrictions faced by public agency staffs concerning discussions of proposed legislation at public meetings. At the Guiding Committee teleconference following the August 2005 AML Forum meeting, some participants believed that a desired outcome for the December meeting was to reach consensus on recommendations for Good Samaritan legislation; the DOC, as the Forum sponsor, however, could not allow the Forum to be used for this purpose. The group discussed the public agencies' predicament as well as its continued interest in the topic. As an alternative desired outcome, some attendees suggested inviting speakers expert in Good Samaritan Law to present their positions, pro and con, for the purpose of educating the Forum, not to reach consensus. The group seemed supportive of this approach, and generally agreed that it would like to see the topic of Good Samaritan Law on a future Forum meeting agenda for discussion purposes only.

The discussion then turned to the membership of the Guiding Committee as outlined in the Forum Charter and its role in providing input for agendas for future Forum meetings. Cy shared with the group a proposed change to Section VI of the Forum Charter, which describes the Forum Membership and Forum Guiding Committee structure; the change would address a potential conflict of interest in having private sector firms represented on the Guiding Committee (particularly firms that also apply for funding from public agencies that participate in the Forum). The group was in general agreement with the Department's concerns and its interest in retaining private sector input on proposed Forum agendas. After a thorough discussion, the group supported the Department's decision that the Guiding Committee would officially be made up of public sector representatives, but that other Forum members were welcome to participate in the Guiding Committee teleconferences. The adopted language is provided below. (The California Abandoned Mine Lands Forum Charter is posted on the Forum's website at http://www.consrv.ca.gov/OMR/abandoned_mine_lands/amlu_forum.htm.)

> ***Guiding Committee:*** *A Guiding Committee consisting of the primary DOC Forum representative, at least three but no more than six Forum members who volunteer to serve annually who represent public sector agencies (State, Federal, City, or County), and the Forum's outside facilitator. This Committee as a whole shall be responsible for:*
>
> 1. *Developing possible agenda items for future Forum meetings.*
> 2. *Leading or appointing leaders and assist in recruiting volunteers for any ad hoc working groups the Forum agrees to convene.*
> 3. *During the full Forum meeting and any Guiding Committee meetings, the Forum's facilitator will establish a clear context and structured framework for discussions, and help maintain a comfortable meeting climate that promotes trust and respect among Forum and Guiding Committee members."*

Public Agency Guiding Committee Members: Nominations for Forum Guiding Committee members (those present at the Forum meeting) were made as follows:

Department of Conservation – Cy Oggins, Manager, Abandoned Mine Lands Unit
State Lands Commission – Greg Pelka
U.S. Bureau of Land Management/CASO – David Lawler
U.S. Forest Service – Rick Weaver
County Representative – Tracy Gidel, Nevada County

Suggestions were also made to nominate persons not in attendance at the Forum meeting such as representatives of the State Water Resources Control Board (Rick Humphreys), California Department of Toxic Substance Control (unnamed), and the U.S. Geological Survey (Charles Alpers, nominated by Roger Hothem). Carol Atkins, a new addition to the staff of the California Bay-Delta Authority and a former facilitator of both the AML Forum and the Sierra-Trinity Abandoned Mine Lands Agency Group (STAMLAG—this group became a Forum subcommittee in October 2005), was also later invited to participate in the Guiding Committee. While no decision was made to change the composition of the Guiding Committee for 2006, interested Forum participants are welcome to participate in all Guiding Committee activities.

5. Next Meeting and Meeting Evaluation

The next meeting was tentatively set for March 15, 2006 from 9:00 AM to noon. The State Lands Commission staff offered to see if the Commission's conference room was available at that date and time for the next meeting.

Mary Kay Lahay then led the group in a quick meeting evaluation and the meeting was adjourned on time.

Meeting Pluses	Meeting Deltas/Improvements
• The group learned a lot from the presentations today. • The group liked having time for follow-up discussions (for example, the cost-benefit analysis examples today, and the discussion that followed after the Border issues item several meetings ago).	• Need even more time after presentations for questions, closure, and next steps. • Focus presentations on key stumbling blocks, solutions, and lessons learned. • Suggest that future agenda topics also state the desired outcome. • Post presentations on the AML Forum website before and after our meetings.

For additional information about the meeting, contact Sarah Reeves at sreeves@consrv.ca.gov or (916) 322-4143.